

REMARKS**Summary of the Office Action**

Claim 3 stands rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Sekine et al. (U.S. Pub. No. 2002/0153492) (hereinafter "Sekine").

Claims 4, 5, 12 and 15-17 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Sekine as applied to claim 3 above, and further in view of Yoneta et al. (U.S. Pub. No. 2003/0034496) (hereinafter "Yoneta").

Summary of the Response to the Office Action

Applicant has amended claim 3 to differently describe embodiments of the disclosure of the instant application. Accordingly, claims 1, 3-5, 12 and 15-17 are currently pending and under consideration.

Rejection under 35 U.S.C. §§ 102(b) and 103(a)

Claim 3 stands rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Sekine. Claims 4, 5, 12 and 15-17 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Sekine as applied to claim 3 above, and further in view of Yoneta. Applicant has amended claim 3 to differently describe embodiments of the disclosure of the instant application. To the extent that these rejections might be deemed to still apply to the claims as newly-amended, the rejections are respectfully traversed for at least the following reasons.

Applicant respectfully submits that support for the newly-implemented amendments to independent claim 3 of the instant application is found, for example, in paragraph [0059] of the specification of the instant application.

Applicant respectfully submits that it is understood in the associated art that heating and pressurization are required in the processing of flip-chip bonding. See paragraph [0004] of the specification of the instant application. A flat collet (see Fig. 25A of the present application) or a pyramidal collet (see Fig. 25B of the present application) can be used to mount a photodiode array.

For the arrangements described in connection with the instant application, a flat collet is utilized. Applicant respectfully submits that if the pyramidal collet is utilized in a situation in which an area of tip is as large as the one described in the present application, warping would occur due to the gap that forms between the chip and the pyramidal collet. Even further, a positional deviation may occur due to this warping, causing a lowering of the mounting precision. See paragraph [0004] of the specification of the instant application.

Moreover, Applicant respectfully submits that heating and pressurization are required in the process of flip-chip bonding, and with the pyramidal collet, the heat conduction efficiency is poor and the edges of the chip may become damaged due to the applied pressure. Accordingly, it is evident for at least the foregoing reasons that a pyramidal collet is unsuitable, particularly when utilized in arrangement in which the area of the chip is as large as that of the disclosure of the present application.

As a result of these reasons, the present application utilizes a flat collet that comes in planar contact with the chip surface as shown in Fig. 25A for performing flip-chip bonding. However, Applicant respectfully submits that because a light-incident surface at which a plurality of impurity diffused layers that make up the light-incident portion are formed (that is, a photodiodes array) comes in contact with the flat collet, the light-incident surface suffers physical damage such as appearance defects and degradation of characteristics (increased dark

current and noise, and the like) due to surface flaws. See paragraph [0005] of the specification of the instant application. Applicant respectfully submits that the invention disclosed in the instant application is characterized by the forming of a plurality of depressions on a side of the incident surface of the light to be detected, in the semiconductor substrate. Applicant respectfully submits that such an advantageous arrangement is provided to eliminate damage such as that discussed previously.

Applicant respectfully submits that Sekine describes a radiation detector formed by embedding a plurality of small photodiode arrays 73 (manufactured besides a substrate 70) into a first groove section 71 of the substrate 70 such as a MID (Molded Interconnected Device) substrate. Applicant notes that the substrate 70 described in Sekine is a MID substrate and not a semiconductor substrate, but it is the insulated substrate. In the present invention, the semiconductor substrate of the first conductive type is used.

Furthermore, in Sekine, Applicant respectfully submits that because the plurality of photodiode arrays 73 are manufactured besides the substrate 70, the plurality of impurity diffused layers of the second conductive type are not arranged in the substrate 70.

Applicant respectfully submits that the above-discussed constitutional differences arise from the differences between these respective technical concepts. In the present invention, to make it possible for a photodiode array to have a large area, a plurality of photodiodes (that is, the parts where the plurality of impurity diffused layers of the second conductive type are formed) are formed directly on the semiconductor substrate of the first conductive type.

On the other hand, in the arrangement disclosed in Sekine, in order to enable a photodiode array to have a large area, the plurality of small photodiode arrays 73 made in another process is embedded into the first groove section 71 of the substrate 70.

Applicant respectfully submits that Sekine neither describes, nor even suggests, the advantageous concept associated with the invention disclosed in the instant application, which is to form a plurality of depressions on a side of the incident surface of the light to be detected, in the semiconductor substrate, to solve the above-discussed problems by using the flat collet arrangement. Applicant respectfully submits that the flat collet is not utilized in the arrangement disclosed in Sekine. Furthermore, Applicant respectfully submits that in Sekine, if the plurality of photodiode arrays 73 are mounted on the substrate 70 by utilizing a flat collet, the plurality of photodiode arrays 73 would suffer physical damage. Therefore, Applicant respectfully submits that one having ordinary skill in the relevant art would not look to Sekine in order to resolve the above-mentioned problems by utilizing a flat collet for at least the foregoing reasons.

Accordingly, Applicant respectfully asserts that the rejections under 35 U.S.C. §§ 102(b) and 103(a) should be withdrawn because Sekine does not teach or suggest each feature of independent claim 3 of the instant application. As pointed out in MPEP § 2131, "[t]o anticipate a claim, the reference must teach every element of the claim." Thus, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Verdegaal Bros. v. Union Oil Co. Of California, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987)." Similarly, MPEP § 2143.03 instructs that "'[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.' In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." Since the prior art does not disclose or suggest any of the combinations recited in Applicant's claims, and if anything appears to teach away from the current claim recitations, KSR Int'l Co. v. Teleflex Inc., 127 S.Ct. 1727 (2007), Applicant submits that such recited combinations would not have been obvious in

view of the applied references of record, whether taken alone or combined in the manner suggested by the Examiner in the Office Action.

As independent claim 3 is generic and now in condition for allowance, rejoinder of withdrawn independent claim 1 is respectfully requested if the Examiner deems that such an approach is appropriate.

Furthermore, Applicant respectfully asserts that the dependent claims 4, 5, 12 and 15-17 are allowable at least because of their dependence from independent claim 1 or 3, and the reasons discussed previously. Also, Applicant respectfully submits that the additionally-applied reference to Yoneta with regard to these dependent claims does not cure the deficiencies discussed above with regard to Sekine.

CONCLUSION

In view of the foregoing discussion, Applicant respectfully requests the entry of the amendment to place the application in clear condition for allowance or, in the alternative, in better form for appeal. Should the Examiner feel that there are any issues outstanding after consideration of this response; the Examiner is invited to contact Applicant's undersigned representative to expedite prosecution. A favorable action is awaited.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including

any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573.

This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

DRINKER BIDDLE & REATH LLP

Dated: July 6, 2010

By:

A handwritten signature in black ink, appearing to read "Paul A. Fournier", is written over a horizontal line.

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